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(54) Vehicle body construction

(57) The side walls of an insulated vehicle body are made up from a plurality of panels (4) each comprising plastics edge mambers (7) and skins (5,6) which define a box-section filed with in situ cured foam. On the interior surface (3) of the vehicle the skins (5) abut to form a neat joint. On the exterior the panels are joined to a joining member (14) which is covered by a cap (18).

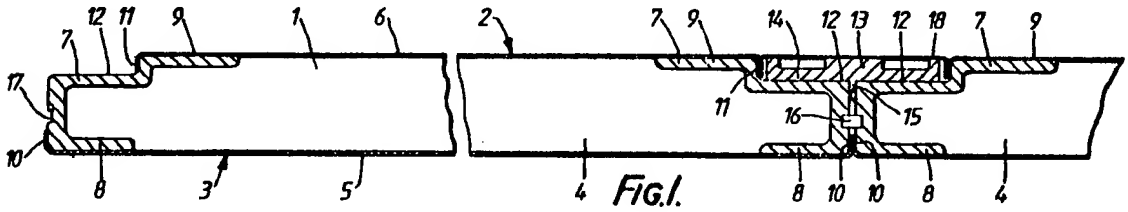

FIG.1.

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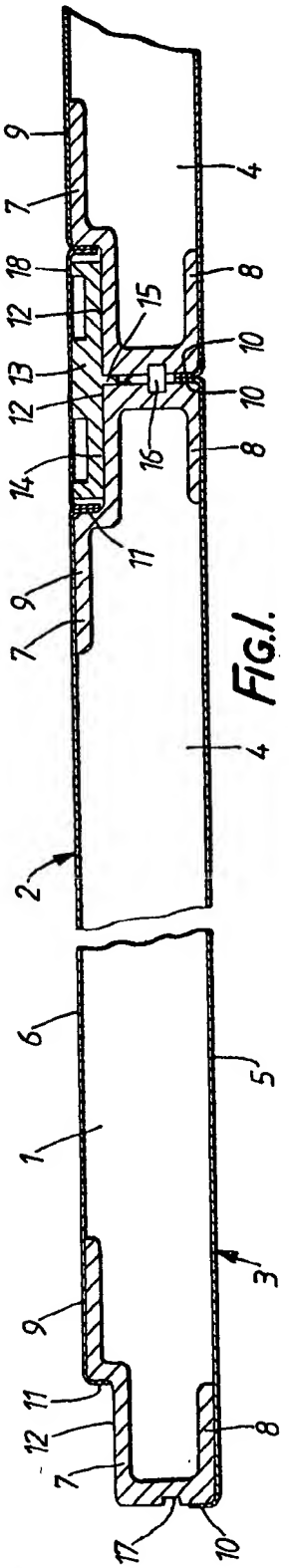
9
7
18
12
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12
14
9
7
6
1
9
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12
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17
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4
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15
10
10
8
16
11
4
2
5
3
8

FIG.1.

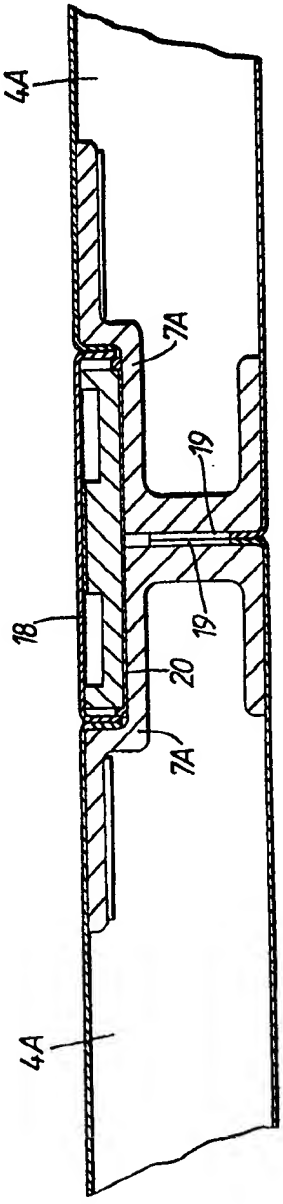
4A
7A
19
19
18
20
7A
4A

FIG.2.

SPECIFICATION

Vehicle body construction

This invention relates to vehicle body construction, and in the preferred embodiment provides an insulated vehicle body the side walls of which are made up of a plurality of panels.

The term "vehicle body" used herein is intended to include not only conventional vehicle bodies rigidly mounted on a fixed chassis, but also bodies of trailers, semi-trailers and freight containers.

Insulated vehicle bodies are widely used for the transportation of perishable foodstuffs and are less commonly used in other applications requiring temperature control, for example, the housing of specialist electronic equipment.

We have proposed in our British patent application GB 2107258 to construct such vehicle bodies by means of a modular system, thereby obviating various problems associated with conventional body building techniques.

Whilst the modular vehicle construction disclosed in our above mentioned patent application has been found satisfactory, it has become desirable to modify the construction by reducing the overall thickness of the side walls of the vehicle. By suitable design of relatively thin side walls, together with improvements in the insulation of the vehicle body floor and/or front bulkhead and/or rear doors and/or roof the freight capacity of a vehicle body (in terms of cubic metres) can be increased without increasing the overall width of the vehicle body or significantly affecting the overall thermal efficiency.

The reduced wall thickness has enabled us to produce a modified wall panel which, whilst retaining the virtues of modular construction described in our above mentioned patent application, offers various further advantages.

According to one aspect of the present invention there is provided an insulated vehicle body having side walls each including a plurality of panels assembled together in edge-to-edge relation, wherein each panel comprises an inner skin, an outer skin, a unitary plastics edge member located at each side edge and bonded to the inner and outer skins to form therewith a box-section, and an in situ cured foam filling the box section and bonded to the skins, and wherein adjacent panels are in abutting relation on one side of the side wall to form a substantially smooth wall surface on that side and are joined to a common joining member on the other side of the side wall, the joining member not projecting substantially beyond the plane of the adjacent panel skins.

Preferably the panels abut at the interior surface at each side wall, and the inner skin extends from edge-to-edge of the panel so that at the abutting edges the panel skins provide a substantially smooth and continuous wall surface. In this way, a particularly pleasing and hygienic joint is formed at each panel edge. Further, the edge members, on the exterior side of each panel, preferably include a joggle whereby the abutting edges of adjacent panels form a recess which completely houses the joining member. Preferably, the outer surface of the joining member lies somewhat inside the plane defined by the adjacent outer skins, thereby enabling a cap member to be positioned over the joining member, the outer surface of the cap member lying substantially flush with the plane defined by the outer skins, thereby providing a substantially smooth exterior surface for the vehicle body.

In the preferred embodiment the joining member is of metal, for example extruded aluminium alloy, and extends to the minimum possible extent through the thickness of the side wall. Thus, a complete "thermal-break" is formed at each panel edge, thereby ensuring that thermal conductivity of the side wall is kept at a minimum.

The plastics edge members are preferably of glass reinforced plastics, and include flat flange surfaces to which the inner and outer skins are bonded by means of suitable adhesives. Preferably, the inner and outer skins extend completely flat across the width of each panel, except at the extremeties where the edges of the skins are turned at right-angles to the respective planes of the skins to lie against supporting surfaces defined by the edge members. This structure assists in forming neat joints between the inner skins of adjacent panels, and between each outer skin and the adjacent cap member.

The above and further features and advantages of the invention will become clear from the following description of a preferred embodiment thereof, given by way of example only, reference being had to the accompanying drawing wherein:

Figure 1 illustrates a horizontal cross-section through a portion of the wall of a refrigerated vehicle; and

Figure 2 illustrates a modified construction.

Fig. 1 shows a portion of the wall 1 of a refrigerated freight vehicle. The wall 1 has an exterior surface 2 which is visible from the exterior of the vehicle, and an interior surface 3 which forms the wall surface of the vehicle interior. The wall 1 is assembled from a plurality of modular panels 4. The drawing shows opposite lateral edges of one such panel and, on the right-hand side of the drawing, the left-hand edge of an adjacent panel 4.

The panels 4 extend substantially the entire height of the vehicle body, and preferably all panels 4 and substantially identical. It will be appreciated, however, that the panels 4 may vary from each other in respect of panel width

(measured from front to rear of the vehicle body) and some panels may include special features such as reinforcement to receive load restraint components, door frames, or the like. However, it is of course desirable to keep the number of different panel types used as small as possible.

Each panel 4 comprises an inner skin 5 and an outer skin 6 of suitable material, for example pre-painted aluminium. At the lateral edges of each panel the skins 5, 6 are joined to edge members 7 of glass reinforced plastics material. Each edge member 7 includes an inner flange 8 and outer flange 9 to which the inner skin 5 and outer skin 6 are respectively bonded by means of suitable adhesive. It will be appreciated that the use of adhesive bonding obviates the need to disrupt the smooth inner and outer surfaces of each panel by rivets or the like.

The inner skin 5 extends over the entire width of the panel, and is completely flat except at the extreme edges of the panel where inturned flanges 10 lie against and are bonded to suitable support surfaces of the edge members 7. In the assembled configuration illustrated in the drawing the flanges 10 of adjacent panels firmly abut each other to form a neat vertical joint between adjacent panels. Although there is some very minor disruption of surface continuity at each such joint, the interior surface of the vehicle is substantially smooth and flat.

The outer skin 6 terminates at in-turned flanges 11 which are supported on appropriate surfaces of the edge members 7 in a similar manner to the flanges 10. The outer skin stops somewhat short of the edge of the panel to expose a joggle portion 12 of the edge members 7. At each joint, the two adjacent joggle portions 12 define a recess 13 which substantially completely houses a joining member 14 of extruded aluminium. Each pair of edge members 7 at a joint are separately secured to the joining member 14 by suitable means, e.g. rivets, to provide a strong joint between the panels.

It will be noted that the joining member 14 includes a small flange 15 which extends between the edge members 7 of adjacent panels 4 for the purpose of ensuring correct location and alignment of the panels, but that the joining member 14 does not extend through the entire thickness of the wall. Thus, no metallic member bridges the space between the inner and outer skins, and a thermal-break is formed at each joint. The space between the confronting faces of the flange 15 and the flanges 10 is filled with a suitable sealing medium 16 to ensure that the joint is water-tight and to reduce thermal conductivity through the joint. To assist in location of the sealing medium the edges of the edge members are preferably provided with a channel 17 extending the full length of each edge member.

The outer surface of the joining member 14 (and its associated rivets or the like) lie sufficiently below the plane of the exterior surface 2 to enable a cap strip 18 to be located over the joining member 14, thereby providing a substantially smooth and continuous exterior surface 2.

During manufacture, the box-section defined by the inner and outer skins 5, 6 and edge members 7 of each panel is filled with an in situ cured foam, for example a polyurethane foam, which during curing bonds firmly to the skins 5, 6 and to the edge members 7 whereby each panel becomes a rigid and integral structure.

Fig. 2 illustrates a joint between panels 4A which is similar to the joint shown in Fig. 1 except that the sealing medium 16 and associated channel 17 have been omitted and replaced by strips 19 of adhesive sealant tape, and a separate sealant 20 is provided between the joining member 14A and the edge members 7A. Double sided adhesive tape 21 is provided to assist in securing the capping strip 18 to the joining member 14A.

It will be noted that with side walls constructed as above the capping strip and joining member at each edge of a panel may be removed to release the panel from the adjacent panels. Thus, if suitable provision is made at the top and bottom of the panels to permit removal of panels, a damaged panel may readily be removed and replaced by a new panel without major reconstruction of the vehicle. This feature is of particular value in a vehicle having relatively thin side walls since these are more liable to damage necessitating replacement than are thicker walls.

It will of course be appreciated that whilst the above described embodiments of the invention make use of a specific combination of materials and fixing techniques, other materials and techniques may be used within the scope of the invention. For example, the joining member maybe of GRP, and may be secured by adhesive bonding to the panel edge members.

CLAIMS

1. An insulated vehicle body having side walls each including a plurality of panels assembled together in edge-to-edge relation, wherein each panel comprises an inner skin, an outer skin, a unitary plastics edge member located at each side edge and bonded to the inner and outer skins to form therewith a box-section, and an in situ cured foam filling the box section and bonded to the skins, and wherein adjacent panels are in abutting relation on one side of the side wall to form a substantially smooth wall surface on that side and are joined to a common joining member on the other side of the side wall, the joining member not projecting substantially beyond

the plane of the adjacent panel skins.

2. An insulated vehicle body according to claim 1 wherein, at one surface of each side wall, the panel skins extend from edge-to-edge of each panel so that at the abutting edges of the panels the skins provide a substantially smooth and continuous wall surface.

3. An insulated vehicle body according to claim 2 wherein the panel skins, at said one surface, are flat across the width of each panel except at the extremeties where edges of the skins are turned at right angles to the plane of the skins to lie against supporting surfaces of the edge members.

4. An insulated vehicle body according to claim 3 wherein the turned edges of the skins are in abutting contact.

5. An insulated vehicle body according to any of claims 2 to 4 wherein said one surface is the interior surface.

6. An insulated vehicle body according to any of claims 2 to 5 wherein, at the other surface of each side wall, each edge member includes a joggle whereby abutting edges of adjacent panels form a recess which completely houses the joining member.

7. An insulated vehicle body according to claim 6 wherein the recess also houses a capping member which covers the joining member and has an exposed surface lying substantially flush with the plane defined by the adjacent exposed surfaces of the skins.

8. An insulated vehicle body according to claim 7 wherein the capping member has inturned edge flanges which abut corresponding inturned edge flanges of the adjacent skins.

9. An insulated vehicle body substantially as herein described with reference to the accompanying drawing.

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